

East Valley Water District

The Pipeline

Vital Information on Water and Wastewater Service

California Department of Health Services
Division of Drinking Water and Environmental Management
Drinking Water Program

Perchlorate in California Drinking Water

Updated July 1997

Recently, the inorganic chemical perchlorate has been found in certain drinking water supplies in Northern and Southern California. Perchlorate (as ammonium perchlorate) is used in solid rocket propellants, and has been found in areas where aerospace material development and testing has occurred.

Because perchlorate historically has not been considered a common contaminant, no federal or state drinking water standards exist. However, the Department of Health Services (DHS) has adopted a provisional action level for perchlorate in drinking water of 18 micrograms per liter, or parts per billion (ppb).

Information on human health concern related to perchlorate is limited. In an interview with the author, Dr. Robert L. Smith, a toxicologist at the University of California, San Francisco, stated that perchlorate is a thyroid hormone antagonist, meaning it can interfere with the thyroid gland's ability to produce thyroid hormones. Perchlorate is also a potential carcinogen, meaning it can cause cancer. Perchlorate is also a potential reproductive toxicant, meaning it can cause reproductive problems.

Dr. Smith also stated that perchlorate is a potential neurotoxicant, meaning it can cause neurological problems. He also stated that perchlorate is a potential developmental toxicant, meaning it can cause developmental problems. He also stated that perchlorate is a potential immunotoxicant, meaning it can cause immunological problems.

water wells at levels above the provisional action level of 18 ppb have followed the DHS recommendations.

Northern California

In Northern California, perchlorate has been found in eastern Sacramento County. Several sites have been identified as potential sources of perchlorate contamination. These include Aerojet General Corporation's facility, a site formerly owned by McDonnell-Douglas, and a site formerly owned by Purify Oil Company.

As a result of detection of contaminated shallow groundwater at Aerojet General Corporation's facility, the facility has been shut down and the groundwater has been treated. The facility has been shut down and the groundwater has been treated. The facility has been shut down and the groundwater has been treated.

At the McDonnell-Douglas facility, the groundwater has been treated. The facility has been shut down and the groundwater has been treated. The facility has been shut down and the groundwater has been treated.

At the Purify Oil Company facility, the groundwater has been treated. The facility has been shut down and the groundwater has been treated. The facility has been shut down and the groundwater has been treated.

Perchlorate in California Drinking Water

continued

In January 1997, perchlorate in drinking water wells in Rancho Cordova was present in concentrations as high as 280 ppb, using a laboratory method sensitive to 35 ppb. In April 1997, using an improved method developed by DHS' Sanitation and Radiation Laboratory (SRL) sensitive to 4 ppb, perchlorate was also found in several other drinking water wells in the area.

Certain commercial laboratories have now been approved to perform perchlorate analysis using the method developed by DHS. Interested parties should contact SRL at (213) 580-5795 for information on approved laboratories. ([Laboratory Analyses for Perchlorate](#))

Summary data for DHS analyses of drinking water wells in Northern California as of 7/7/97:

Wells tested for perchlorate	62
Wells in which perchlorate was detected	13
Wells in which perchlorate detections exceeded the 18 ppb action level	8
Wells closed due to perchlorate detections	6

Southern California

Because of the perchlorate experience in the northern part of the state, the DHS Division of Drinking Water and Environmental Management headquarters directed its various district offices of the DHS Drinking Water Program to include perchlorate testing for drinking water systems that are near aerospace and munitions facilities. Subsequently, fireworks

manufacturing facilities were also included.

As a result of the expanded sampling and analyses in Southern California in April, May, and June, some drinking water wells in Loma Linda and Redlands in San Bernardino County were found to contain perchlorate in concentrations of 5 to 216 ppb. The perchlorate contamination is in a TCE plume associated with past operations of the Lockheed Propulsion Company. Some drinking water wells in the city of Riverside sampled in May and June contained low levels of perchlorate (4 to 21 ppb).

Testing of wells in Los Angeles County in May and June showed perchlorate at concentrations of 4 to 159 ppb, in certain wells of drinking water systems that serve parts of Azusa, Baldwin Park, Irwindale, La Canada Flintridge, La Puente, Newhall, Pasadena, Santa Clarita, and West Covina. Several sites have been identified as potential sources of perchlorate contamination, including an Aerojet facility (Azusa), the Azusa landfill, the Whittaker-Bermite site (Santa Clarita), and the Jet Propulsion Laboratory (Pasadena).

Perchlorate was also found at very low levels (from 5 to 9 ppb) in some samples of Colorado River water. No source of this perchlorate has been determined. DHS found perchlorate in samples taken at two Superfund sites

(the Baldwin Park Operable Unit and the Jet Propulsion Laboratory) in their monitoring wells (not drinking water wells). No perchlorate was found in samples from monitoring wells (not drinking water wells). No perchlorate was found in sam- ples from monitoring wells at two other Superfund sites (the Burbank Operable Unit and the Whittaker-Bermite site).

DHS' Advice to Drinking Water Utilities

If perchlorate is found in a drinking water supply at con- centrations exceeding the 18-ppb provisional action level, DHS will advise the utility to remove the contaminated source from service. Under Section 116455 of

DHS' Provisional Action Level for Perchlorate

Following the initial Northern California findings in February 1997, the DHS Drinking Water Program informed drinking water utilities that the U.S. Environmental Protection Agency (U.S. EPA) had evaluat- ed the health effects of perchlo-

the California Health and Safety Code, the water utility is required to notify its city council whenever a well is removed from service due to chemical contamination. If the source is required to meet system demands and cannot be removed from service, and if drinking water that is provided by the utility exceeds the action level, DHS will advise the utility

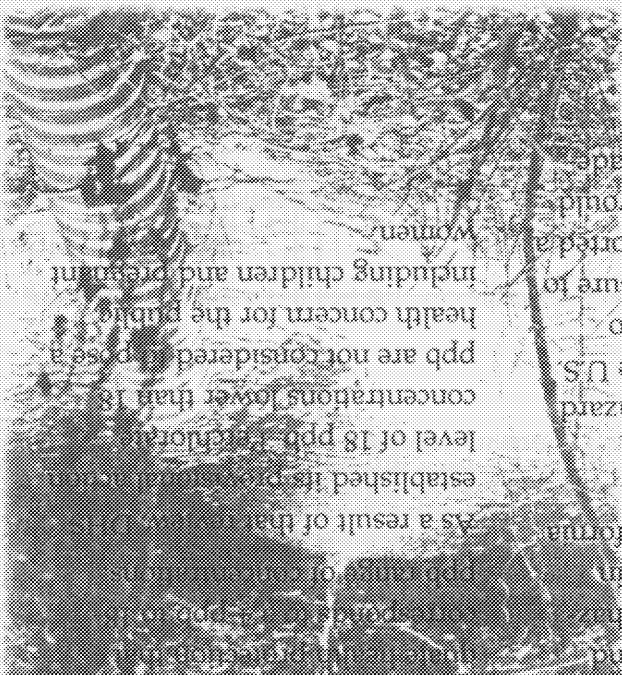
rate as part of its Superfund activities associated with hazardous waste sites. DHS, in cooperation with the California Environmental Protection Agency's Office of Assessment, reviewed the U.S. EPA reports on the risks to human health from exposure to perchlorate. U.S. EPA reported a range of exposures that would be considered to provide ade-

Summary data for DHS analyses of drinking water wells in Southern California as of 7/7/97

Wells tested for perchlorate	170
Wells in which perchlorate was detected	56
Wells in which perchlorate detections exceeded the 18 ppb action level	16
Wells closed due to perchlorate detections	12

to arrange for public notification to its customers. When ever public notification occurs, information about perchlorate in drinking water is to be provided to the consuming population in the affected area that would not directly receive the public notification, including centers, workers, and students.

As a result of that review, DHS established its provisional action level of 18 ppb perchlorate. Concentrations lower than 18 ppb are not considered to pose a health concern for the public, including children and pregnant women.



Our Mission:

To advance the science of water to improve the quality of life.

AWWARF's research program focuses on six key issues: •

Protecting the drinking water consumer from microbial risk •
Protecting the drinking water



American Water Works Association

RESEARCH FOUNDATION

consumer from adverse health effects due to chemicals •
Improving utility management to obtain optimum water quality and system reliability • Improving utility infrastructure for the reliable

delivery of high quality drinking water to the consumer's tap •
Providing science and technology to the drinking water community to improve public and consumer relations • Ensuring access to, and wise use of, water resources and protection of the environment

East Valley Water District

The District covers an area of approximately twenty-five (25) square miles. Approximately 15% of the District is located in the unincorporated area of San Bernardino County and the remaining 85% is

located within the city of San Bernardino and the city of Highland. The District has been engaged in furnishing water and sewer service to its customers since

its inception. The initial sewer trunk lines and collection system were completed during the 1959-60 fiscal year. The District has a service population of approximately 56,000.



**Main San Gabriel Basin
WATERMASTER**

Our Mission:

The Main San Gabriel Basin Watermaster, a nine-person board appointed by the Los Angeles

County Superior Court, administers and enforces the provisions of the judgment which established water rights and the responsibility for

efficient management of the quantity and quality of the basin's ground water.

Our Mission:

The mission of the Metropolitan Water District of Southern California is to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way.



MWD

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Our Mission:

To provide a save, reliable water supply and serve our customers in a responsible manner.



**SOUTHERN NEVADA
WATER AUTHORITY**

San Bernardino Valley Municipal Water District is a special district responsible for long-range water supply planning, water importation, and ground-water management in western San Bernardino County, California. The district spans the eastern two-thirds of the San Bernardino Valley and a portion of the



Yucaipa Valley, and includes the cities and communities of San Bernardino, Colton, Loma Linda, Redlands, Rialto, Bloomington, Highland, Grand Terrace, and Yucaipa. The district was incorporated in 1954 under the Municipal Water District Act of 1911.

Perchlorate

A Brief Overview

Perchlorate

Is a man-made inorganic salt, used as an additive for solid rocket fuel, for military munitions, and also in the pyrotechnics industry. It is a very soluble and mobile contaminant in both groundwater and surface water supplies. The degradation rate of perchlorate in the environment is very slow. Perchlorate has the potential of impacting over 1 million people in Nevada, more than 1 million in Arizona and over 10 million people in California, as well as Native American tribes along the Colorado River. Although the environmental and public health problems of perchlorate have only recently been identified in these areas, perchlorate has been produced and used nationwide. The Department of Defense and NASA have used most of the perchlorate made in the United States.

Known Health Effects

The health effects of perchlorate are known from human and animal testing where perchlorate was used as a medication for hyperthyroidism (Graves Disease). Perchlorate disrupts the thyroid gland's ability to properly

utilize iodine to produce thyroid hormones. Thyroid hormone deficiencies can affect normal metabolism, growth and development. Known effects on thyroid and pituitary systems raise concerns for long term effects of low concentrations on children, developing fetuses and older adults. The effects of perchlorate on infants and older adults are untested. California Department of Health has established an interim drinking water standard of 18 parts per billion.

Concerns:

- Current location data on perchlorate is limited but growing as testing methods improve and "at risk" sites are identified
- The known health effects have long term medical and economical impacts
- The drinking water supply of millions of people is affected
- Developing an effective method for the removal of perchlorate from our water supplies is imperative
- The problems of disposal, storage and handling of this highly volatile material must be addressed
- Economic impacts are unknown at this time

Research

Areojet will begin treating their highest concentrations of perchlorate-laden water in August of 1998 using a bioremediation fluidized bed reactor treatment system. The system will be evaluated to determine if it is effective for removals down to 1 to 18-ppb. The perchlorate treatment facility has been designed to expand from 4,000 to 8,000 gallons per minute.

The Perchlorate Study Group (PSG), chaired by Areojet in partnership with the USAF, is performing \$800,000 to \$1,450,000 in toxicity studies on perchlorate. Results are scheduled to be submitted for EPA (NCEA) review in September 1998.

By May 1998 Areojet is to complete the evaluation of the extent of perchlorate migration offsite to the 4-ppb level. Upon completion of the feasibility study EPA will issue an interim groundwater Record of Decision.

In June 1997, at the request of the East Valley Water District (EVWD), Representative Jerry Lewis (CA) included a \$2 million add-on for the development of perchlorate treatment technologies in the VA/HUD appropriations bill. The appropriation bill was passed in October of 1997, with the \$2 million add-on earmarked to EVWD.

Recognizing the urgent need for treatment technology, EVWD working with the American Water Works Association Research Foundation (AWWARF) hosted a Perchlorate Issue Group in September of 1997. The group

was sponsored by EVWD, the Southern Nevada Water Authority, the San Gabriel Basin Water Master, the San Bernardino Valley Municipal Water District, and the Metropolitan Water District of Southern California. The issue group, consisting of experts from academia, engineering, military, utility, government, and health disciplines, defined a multiyear research agenda for treatment of perchlorate. Over a period of several days, the issue group developed a multiyear research program, costs, and a time frame for implementation.

Request for proposals (RFP's) are being developed to pursue the initial seven high priority projects identified by the issue group. The research program will take 3 to 5 years to reach a point where the technology is in place to provide reliable treatment methods for the removal of perchlorate from drinking water.

Currently, there are no perchlorate treatment systems in operation at any public water systems in the United States and there are no known technologies that can handle large volumes with low concentrations of perchlorate. Biological systems developed by the Air Force can handle high perchlorate concentrations in low volumes, and a biological treatment pilot plant is under construction at the Areojet Superfund site.

Perchlorate is an explosive material and, depending on its concentration, has the potential to be dangerous when storing and handling. This is a problem that also must be addressed.

Background Time Line:

February 1997

- Perchlorate was discovered at the Areojet Superfund site and neighboring Mather Air Force Base site near Sacramento
- Drinking water wells tested positive for perchlorate at detection levels of 100 parts per billion (DL @ 100 ppb).

April 1997 to present

- Department of Health Services (DHS) develops improved testing method (DL @ 4 ppb)
- Perchlorate was found in California in Azusa, the Baldwin Park area of San Gabriel, Raymond Basin, Santa Clarita Basin, Redlands, Rialto, San Jose, Hollister, Santa Susanna, Rancho Cordova, Newhall, La Canada/Flintridge, Pasadena, West Covina, La Puente, Riverside, Loma Linda, and Edwards Air Force Base. Perchlorate has been found in Nevada in Henderson, Las Vegas, Lake Mead and the Colorado River, as well as in Utah.
- At Risk Locations currently identified for testing are sites in Maryland, Virginia, West Virginia, Ohio, Indiana, Illinois, Alabama, Mississippi, Arkansas, Texas, New Mexico, Florida, Arizona, Utah, Nevada and California

June 1997

- Department of Health Services briefing for local water utilities
- Request for funding by EVWD to Representative Jerry Lewis (CA) for treatment technologies through VA/HUD appropriations bill
- Discussion with Association of California Water Agencies and AWWARF on the

development of a perchlorate research program

- AWWARF trustees endorse research program
- Victoria Farms Mutual Water Company located in the San Bernardino Valley ceased delivering drinking water due to perchlorate contamination.

July 1997

- EVWD Board of Directors approves working through AWWARF to develop perchlorate program
- EVWD and AWWARF develop format for Perchlorate Issue Group
- Issue group sponsored by EVWD, Southern Nevada Water Authority, San Gabriel Basin Water Master, San Bernardino Valley Municipal Water District and Metropolitan Water District of Southern California

September 1997

- House-Senate approves VA/HUD appropriations bill - 2 million dollars earmarked for development of treatment technologies for EVWD
- Issue group meets in Ontario, California to develop a multiyear research agenda.

October 1997

- Draft recommendations of Perchlorate Issue Group released
- VA/HUD signed into law

November 1997

- Final report of the Perchlorate Issue Group Workshop issued

Conclusion

Perchlorate has not been considered a common drinking water contaminant, therefore no federal or state drinking water standards exist. California Department of Health Services has adopted a provisional level for perchlorate of 18 ppb based on a reference dose range developed by EPA. The EPA has stated that based on current information, the concentration of 18 ppb of perchlorate in drinking water is adequately protective of public health.

The continuing ability to provide quality drinking water in California, Colorado, Nevada, Arizona, Utah and other areas of the United States is the highest priority of water suppliers throughout these regions. New regulations, treatment, and the containment of this contaminant are challenges that will have major economic, legal and health impacts on the public. The possible closure of and source water supplies will have a rippling effect throughout communities, cities

and states. With the possibility of impacting over 12 million people within the arid Southwest and other regions of the United States, treatment systems for perchlorate must be developed.

The development by the Perchlorate Issue Group of a multiyear research agenda for treatment of perchlorate, hosted by the American Water Works Research Foundation and East Valley Water District, was the first step. The research program will take 3 to 5 years to reach a point where the technology is in place to provide reliable treatment methods for the removal of perchlorate from drinking water. Therefore the continued support of federal and state elected officials in securing funding for future research and implementation is vital to the development of a method for the removal of perchlorate from our drinking water supplies.